METHOD AND APPARATUS OF ASYMMETRIC INJECTION INTO SUBSONIC FLOW OF A HIGH ASPECT RATIO/COMPLEX GEOMETRY NOZZLE

ABSTRACT OF THE INVENTION.

The present invention reveals a method and apparatus for controlling the effective area and thrust vector angle of a fluid flow. In one embodiment, the fluid flow is controlled in an advanced, high aspect ratio, complex aperture geometry nozzle using asymmetric injection into the subsonic portion of the fluid flow. The present invention vectors the primary flow by partially blocking the flow with an opposed flow across the flow field. A fluidic flow field is defined in a flow container that directs a pressurized, primary fluidic flow from the container towards an exit of the container. A nozzle may cooperate with the exit of the flow container to control the fluidic flow as it exits the flow container. One or more injectors associated with the container are proximate to the effect throat of the primary flow while other are located downstream of to introduce an opposing fluidic flow that interacts with the primary fluidic flow. A controller associated with the injectors directs the injectors to provide the opposing flow as needed to achieve a desired partial blockage of the primary flow, thereby vectoring the primary flow.